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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/976,194	10/11/2001	Joel C. VanderZee	D-2737/WOD	1444

7590 05/31/2005

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EXAMINER	
WEST, JEFFREY R	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/976,194	VANDERZEE ET AL.
	Examiner	Art Unit
	Jeffrey R. West	2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,16-33 and 35-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,16-33 and 35-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 8-10, 20-24, 27-29, 39 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,521,482 to Lang et al.

Lang discloses an apparatus for generating a data value representative of instantaneous three-phase power factor comprising a processor for simultaneously sampling voltage levels and current levels from power source lines of a three-phase power system (column 6, lines 19-43) to form a set of voltage and current levels (column 7, lines 47-59 and column 8, lines 14-19), the processor being responsive to the set of voltage and current levels to generate the data value representative of instantaneous three-phase power factor (column 11, lines 4-20). Lang also discloses sampling the sets of voltages and current levels at a predetermined sampling rate over a predetermined time interval (column 7, lines 47-59) and determining the power factor per line cycle (i.e. motor revolution) (column 17, lines 63-66)

Lang discloses that the processor is responsive to a voltage level subset and a current level subset of the set of voltage and current levels to generate real and

imaginary component data values representative of a voltage phasor as part of generating the data value representative of the instantaneous three-phase power factor (column 9, line 30 to column 10, line 4).

Lang also discloses that voltage level subset comprises a first phase voltage level sampled from a first source line of the power source lines relative to a common voltage reference, a second phase voltage level sampled from a second source line of the power source lines relative to a common voltage reference, and a third phase voltage level sampled from a third source line of the power source lines relative to a common voltage reference (column 6, lines 39-54).

Lang also discloses that the current level subset comprises a first phase current level sampled from a first source line of the power source lines, a second phase current level sampled from a second source line of the power source line, and a third phase current level sampled form a third line of the power source lines (column 6, lines 19-38 and Figure 2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 6, 7, 11, 12, 25, 26, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang in view of U.S. Patent No. 5,673,196 to Hoffman et al.

As noted above, the invention of Lang teaches many of the features of the claimed invention and while the invention of Lang does disclose the processor being responsive to phase current and voltage signals, Lang does not specifically specify that the processor is responsive to line current and voltage signals.

Hoffman teaches vector electricity meters and associated vector electricity metering methods comprising a processor (column 8, lines 1-19) for simultaneously sampling voltage levels and current levels from power source lines of a three-phase power system to form a set of voltage and current levels (column 3, lines 49-53 and Figure 1), wherein the processor is responsive to the set of voltage and current levels to generate a data value representative of thee-phase power factor (column 3, lines 53-55 and 62). Hoffman also teaches that the processor is responsive to a voltage level subset and a current level subset of the set of voltage and current levels to generate vectors as part of generating the value representative of the instantaneous three-phase power factor wherein the voltage level subset comprises three phase voltage levels sampled from each of the three power source lines relative to a common voltage line (column 4, lines 24-30, column 7, lines 57-61, and Figure 1) and/or three line voltage levels sampled from a first power source line relative to another power source line (column 4, lines 12-19, column 7, lines 57-61, and Figure 1) and also wherein the current level subset comprises three phase current levels sampled from each of the three power source lines (column 4, lines

24-30, column 7, lines 57-61, and Figure 1) and/or three line current levels sampled from each of the three power source lines (column 4, lines 12-19, column 7, lines 57-61, Figure 1, and column 10, lines 26-32).

Hoffman also discloses sampling the plurality of sets of voltages at a predetermined sampling rate over a predetermined time interval to distribute the sample locations in the line cycle period (column 4, lines 19-23 and 30-49).

It would have been obvious to one having ordinary skill in the art to modify the invention of Lang to specify that the processor is responsive to line current and voltage signals, as taught by Hoffman, because Hoffman suggests that when monitoring voltage and current signals in a real environment, it is often required to determine these values based on different three-phase configurations with different values able to be obtained (column 10, lines 15-32) and therefore the combination would have provided means for determining the power factor in a wider variety of environments such as a common configuration with no neutral line.

5. Claims 13, 14, 16-19, 32, 33, and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang in view Hoffman and further in view of U.S. Patent No. 5,434,738 to Kurszewski et al.

As noted above, the invention of Lang and Hoffman teaches many of the features of the claimed invention and while the invention of Lang and Hoffman does teach determining the power factor for a supply on a load such as a motor, the combination does not teach continuously generating a set of instantaneous three-

phase power factor data values in order to check if a predetermined consecutive number of values are negative in order to declare a detection of a momentary power loss condition and command that the load of the system be temporarily disconnected.

Kurszewski teaches an apparatus and method for protecting induction motors from momentary power loss comprising continuously generating a set of instantaneous three-phase power factor data values (column 7, lines 35-64), determining whether the instantaneous three-phase power factor data values are negative, indicating a detection of a momentary power loss condition (column 6, lines 36-49), a plurality of consecutive times (column 9, lines 22-35) and, if so, commanding that the load of the system be temporarily disconnected (column 6, lines 18-27 and column 11, lines 36-38). Kurszewski also teaches plotting values representing the power factor as vectors with associated angles (i.e. phasors) (column 6, lines 49-64 and Figure 5).

It would have been obvious to one having ordinary skill in the art to modify the invention of Lang and Hoffman to include continuously generating a plurality of instantaneous three-phase power factor data values in order to check if a predetermined consecutive number of values are negative in order to declare a detection of a momentary power loss condition and command that the load of the system be temporarily disconnected, as taught by Kurszewski, because, as suggested by Kurszewski, the combination would have allowed for the detection of momentary power supply faults and caused shutting down the motor due to such a

condition thereby preventing costly damage to the motor and associated equipment (column 1, line 55 to column 2, line 2).

6. Claims 40 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang in view of U.S. Patent No. 5,229,713 to Bullock et al.

As noted above, the invention of Lang teaches many of the features of the claimed invention including determining the power factor per line cycle (i.e. motor revolution) (column 17, lines 63-66) as well as determining the power factor based on RMS values (column 20, lines 11-20), but does not explicitly teach averaging the instantaneous power factor to determine a power factor.

Bullock teaches a method for determining electrical energy consumption by determining real power, reactive power, and a power factor (column 8, lines 8-13) wherein the power factor is determined instantaneously (column 11, lines 13-36 and column 13, lines 14-22) or averaged (column 14, line 59 to column 15, line 7) over a time interval (column 14, lines 52-58) such as a line cycle (column 5, lines 57-67)

It would have been obvious to one having ordinary skill in the art to modify the invention of Lang to teach averaging the instantaneous power factor to determine a power factor, as taught by Bullock, because Bullock suggests that the combination would have provided more detailed analysis of the performance system of Lang by including additional power factor data indicating the overall power factor performance rather than only instantaneous data (column 14, line 59 to column 15, line 7).

Response to Arguments

7. Applicant's arguments filed March 21, 2005, have been fully considered but they are not persuasive.

Applicant first argues:

"Lang et al. does not provide an instantaneous three phase power factor. Referencing Figure 4 of Lang et al., Phase to Modulation Block 402 requires a series of measurements over time in order to accomplish modulation. Voltage/Current Phase Difference Block 406 depends on Block 402 and thus requires demodulation over time. Power Factor Phase Block 408 in turn depends upon Block 406 and the phase difference calculated therein. This figure clearly shows that power factor as calculated by Lang et al. requires a series of measurements over time.
The sensing of instantaneous current is further defined in Lang et al. as a function of time (for example, column 3, line 30 and column 3, line 56) as is the sensing of voltage (column 3, line 32 for example) The sensed current and sensed voltage signals are specified to provide a phase modulated current signal as a function of time and a phase to modulated voltage signal as a function of time for more than one electrical phase (see column 3, lines 37-42)...Therefore Lang et al. does not disclose an instantaneous three phase power factor. For all of these reasons, claims 1 and 20, and their dependent claims, are submitted to be novel and patentable in view of Lang et al."

The Examiner asserts that the teaching of Lang that the instantaneous current and instantaneous voltage are both a function of time does not suggest that the current and voltage values are not instantaneous. As discussed by Applicant, Lang explicitly states that the when determining the values for use in calculating the power factor, "[t]he method comprises the steps of sensing the instantaneous current signal as a function of time for more than one electrical phase of the motor. The instantaneous voltage signal is also sensed as a function of time for more than one

electrical phase of the motor." Therefore, Lang specifically discloses determining instantaneous current and voltage values. Referring to instantaneous current and voltage values 'as a function of time' only indicates that time influences the corresponding currents and voltages, and therefore each voltage and current value is still a current or voltage value at a specific point in time (i.e. instantaneous).

The following references further support this assertion:

U.S. Patent Application Publication No. 2001/0035690 to Kato et al. recites, "L(t) is the total self-inductance of the stator as a function of time, I(t) is the instantaneous current flowing through the circuit as a function of time" (0076).

U.S. Patent No. 6,212,923 to Clark recites, "the microprocessor divides the measured voltage difference by the known resistance value of the resistance 606 so as to arrive at a value that represents the instantaneous current passing through the motor as a function of time" (column 11, lines 1-5)

U.S. Patent No. 6,128,583 to Dowling recites, "simultaneously sensing an instantaneous current signal supplied to the motor as a function of time for three electrical phases of the motor; simultaneously sensing an instantaneous voltage supplied to the motor as a function of time for three electrical phases of the motor" (column 2, lines 16-35).

U.S. Patent No. 5,528,136 to Rogoff et al. recites, "FIG. 3 is a graph showing instantaneous current as a function of time" (column 6, lines 33-34).

U.S. Patent No. 5,485,393 to Bradford recites, "The term v(t) is, at various times, referred to as the voltage as a function of time, the instantaneous voltage at time t,

or the voltage waveform, while the term i(t) is referred to as the current as a function of time, the instantaneous current at time t, or the current waveform" (column 1, lines 22-40).

Applicant then argues:

"The rejection of claims 2 and 21 are independently traversed inasmuch as Lang et al. does not disclose simultaneous sampling as is required by these claims (see Specification, page 11, lines 16-19 for background). This can be further confirmed in Lang et al. at column 14, lines 65-67 which states that power factor is utilized for each phase as the function of time. Lang et al. clearly states that it measures only a single simultaneous instantaneous current signal and a single instantaneous voltage signal (see Lang et al. at column 22, lines 12-15). Consequently, claims 2 and 21 are submitted to be independently novel and patentable in view of Lang et al."

The Examiner asserts that Figure 1 illustrates the simultaneous sampling of conditioned voltage and current signals in accordance with column 7, lines 46-59 which recite, "The system 10 further includes a plurality of individual analog-to-digital converters 64 shown collectively FIG. 1. The analog-to-digital converters 64 function in a manner well known in the art to receive the conditioned and filtered analog output signals from the corresponding signal conditioner 62 and convert the received analog signals at a predetermined sampling rate into digital signals for data manipulation and analysis by the computer 12. A typical sampling rate could be 1,000 samples per second for each signal. Thus, each of the analog-to-digital converters 64 produces an output data array or bit stream corresponding to the particular sensor 40 with which the analog-to-digital converter is associated."

Applicant also argues:

"Claims 13, 16, 32 and 35 are submitted to be independently patentable in view of Lang et al. in view of the concept of generating a set or plurality of instantaneous three phase power factor data values while claims 17 and 36 are submitted to be independently novel and patentable due to the concept of checking if each of the predetermined consecutive number of most recent values is less than or equal to zero. Moreover, claims 18 and 37 are submitted to be independently novel and patentable due to their determination of a momentary power loss condition if each of those data values were less than or equal to zero. Claims 19 and 38 are also submitted to be independently novel and patentable in the concept of temporarily disconnecting the power source line when the momentary power loss is initially detected."

The Examiner asserts that while Applicant has indicated the independent patentability of the listed claims, Applicant has not indicated any reasoning as to why the outstanding rejections are not correct. Since Applicant is providing a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references, Applicant's arguments are not considered to be persuasive.

Applicant argues:

"Without repeating the information provided in that Amendment A, those instances are again called out and it is submitted that Hoffman et al, like Lang et al, fails to disclose the calculation of an instantaneous power factor and that claims 1 and 20 and their dependent claims are novel and patentable in view of any proposed combination of Lang et al. and Hoffman et al. With regard to each of the foregoing combinations, there is no reason identified in either Lang et al. or Hoffman et al. to either be combined together or to be modified after such combination to result in the claimed invention. Therefore applicant submits that the claims on file are novel and patentable in view of these references whether taken individually or in combination."

The Examiner asserts that Applicant has not clearly pointed out why the combination proposed by the Examiner is not sufficient and the Examiner maintains that it would have been obvious to one having ordinary skill in the art to modify the invention of Lang to specify that the processor is responsive to line current and voltage signals, as taught by Hoffman, because Hoffman suggests that when monitoring voltage and current signals in a real environment, it is often required to determine these values based on different three-phase configurations with different values able to be obtained (column 10, lines 15-32) and therefore the combination would have provided means for determining the power factor in a wider variety of environments such as a common configuration with no neutral line.

Applicant then argues:

"With regard to numbered paragraph 7 of the Action wherein claims 40-42 stand rejected under 35 U.S.C. Section 103(a) in view of the proposed combination of Lang et al. and U.S. Patent 5,229,713 to Bullock et al., applicant again respectfully traverses this rejection. Claims 40 and 42 are submitted to be independently novel and patentable due to their averaging concept. Applicant disagrees with the Examiner's statement that power factor is determined instantaneously in Bullock et al. based on column 11, lines 13-36. Bullock et al. in column 11, lines 21-22 specifically states that a pulse is provided to a power factor lookup register. This pulse is produced in response to a predetermined consumption of reactive energy by the load (see column 11, lines 4-5). Thus Bullock et al. does not produce an instantaneous power factor and claims 40-42 are submitted to be novel and patentable for these and all the foregoing reasons presented above."

The Examiner asserts that Bullock specifically determines real power, reactive power, and a power factor (column 8, lines 8-13, "In the foregoing manner, the present invention accounts for real power, reactive power, power factor, and

apparent power. These quantities can then be combined in some manner and/or maintained separately to provide an output to be displayed and/or stored in an electronic memory") wherein the power factor is determined instantaneously (column 13, lines 14-12, "For example, assume that an electro-mechanical meter is being used and the rotation of the kilovar-hour disk of the meter moves a paper chart in a continuous manner while the rotation of the kilowatt-hour disk moves a pen across the chart in a continuous manner. The curve or line graph drawn is a plot of kVARh against kWh. The length of the line graph represents the kVAh metered while the slope of the line at any point represents the instantaneous power factor") or averaged (column 14, line 59 to column 15, line 7, "Alternatively, the 'average' power factor for the most recent demand interval may be determined from the values of P and S at the end of the interval. The algorithm has been extensively tested with pulse input trains representing randomly varying power factors for random periods of time")

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

Saadat, "Power System Analysis" teaches the analysis of phase and line voltages and currents of three-phase wye and delta configurations wherein, in a wye configuration, phase currents are the same as line currents (page 33, 2.28) and, in a delta configuration, line voltages are the same as phase voltages (page 34, 2.29).

Saadat also teaches that line voltages of three-phase systems are taken with respect to each other.

Grady et al., "Harmonics and How They Relate to Power Factor" teaches a method for determining a true power factor by determining the ratio of average power to apparent power over a plurality of harmonics (i.e. an average of a plurality of instantaneous power factors at each of the harmonics) (pages 1-2, "Power Factor in Sinusoidal Situations" and page 4, equation 14). Grady also teaches, in a separate embodiment, a method for compensating for distortion by adding shunt capacitors or active filters to remove the harmonics in order to determine the true power factor from an instantaneous//displacement power factor (page 5, paragraph 3).

U.S. Patent No. 5,629,825 to Wallis et al. teaches an apparatus and method for detecting a fault in a distributed line network including means for determining a true three-phase power factor.

U.S. Patent Application Publication No. 2001/0035690 to Kato et al. teaches magneto-cumulative generator performance by using variable bitter coil-type stator windings.

U.S. Patent No. 6,212,923 to Clark teaches a lock including means for sensing position of a bolt and for indicating whether or not the bolt is extended from a lock case.

U.S. Patent No. 6,128,583 to Dowling teaches a motor stator condition analyzer.

U.S. Patent No. 5,528,136 to Rogoff et al. teaches a VLSI component tester with average current measuring capability.

U.S. Patent No. 5,485,393 to Bradford teaches a method and apparatus for measuring electrical parameters using a differentiating current sensor and a digital integrator.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone number for the organization where this application or proceeding is assigned is (703)308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
May 19, 2005

MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800